

First records of the American bullfrog *Lithobates catesbeianus* (Shaw, 1802) in Slovenia

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Abstract. The American bullfrog *Lithobates catesbeianus* is one of the 100 worst alien species in the world. It has been introduced to several European countries. During our field search activities in May 2014 and June 2015, a male bullfrog advertisement call was heard at Fiesa Lakes in Slovenia. On September 2015, a male specimen of the American bullfrog was caught in a funnel trap at the same location. These are the first records of the occurrence of this invasive species in Slovenia. Further studies should be conducted to evaluate if an actual population is present in the area. Eradication measures should commence immediately as chances for the establishment of naturalized bullfrog populations here are high.

Key words: invasive species, *Lithobates catesbeianus*, Slovenia, first records

Izvleček. Prvi podatki o pojavljanju volovske žabe *Lithobates catesbeianus* (Shaw, 1802) v Sloveniji – Volovska žaba *Lithobates catesbeianus* je ena izmed 100 najhujših invazivnih vrst na svetu. Naseljena je bila v številne evropske države. Med terenskim popisom maja 2014 in junija 2015 je bil pri jezerih v Fiesi v Sloveniji slišan paritveni klic samca volovske žabe. Septembra 2015 se je na isti lokaciji v vršo ujel samec volovske žabe. To so prvi podatki o pojavljanju te invazivne vrste v Sloveniji. Nadaljnje raziskave bi bile potrebne, da se oceni ali je na območju prisotna populacija te vrste. Ukrepi odstranitve te vrste iz okolja morajo steči nemudoma, saj je verjetnost naturalizacije vrste na tem območju visoka.

Ključne besede: invazivne vrste, *Lithobates catesbeianus*, Slovenija, prvi podatki

Introduction

The American bullfrog is one of the 100 worst invasive alien species in the world (Lowe et al. 2000, DAISIE 2008), playing a certain role in the decline of some native species in Europe (Veenvliet & Kus Veenvliet 2002, DAISIE 2008, Kraus 2009). Invasive bullfrogs have a negative impact on native species via competition, predation, and habitat displacement (Pearl et al. 2004). They are also known to transmit diseases like chytridiomycosis to local amphibian fauna (Garner et al. 2006). The American bullfrog is native to western North America but has been introduced to over 40 countries and four continents since the 19th century (Ficetola et al. 2007a). The cause of its introductions was mainly their use as edible livestock (Nava 2010). Before its import ban in 1997, they were also widely sold as animals for garden ponds in garden centres (Parrott & Roy 2009). Despite the fact that new introductions are prohibited by law, translocations by personal initiatives seem to be the primary cause of current introductions (Spitzen-van der Sluijs & Zollinger 2010). In Europe, introductions have been observed in Belgium, France, Germany, Greece, the Netherlands, Italy, Spain and the United Kingdom (Ficetola et al. 2007b, IUCN... 2015). Naturalized populations were recorded at least in Belgium, France, Germany, Greece, Italy and the United Kingdom (Ficetola et al. 2007b). American bullfrogs are known to occur in the neighbouring Italy, with some observations from the vicinity of Udine province (Villa Bruna, Carlino: Lapini et al. 1999, Lapini 2007), where the species had been recorded till 1962 and is now considered extinct (Lapini et al. 1999). Another introduction of the bullfrog was recently quoted by Lapini et al. (2014), but it was probably limited to the release of a single male in a garden fishpond in the village of Buttrio near Udine (L. Lapini, pers. comm. 2016).

Materials and methods

On 30. 5. 2014 and 9. 6. 2015, the area of the two lakes in Fiesa on the Slovenian coast (Gauss-Krüger coordinates Y: 389643, X: 43056 [lat.: 45.523007, long.: 13.582537]) was checked for amphibian activity. Afterward, a two-day field work on invasive species within the framework of activities carried out by Societas herpetologica slovenica was conducted on 27. and 28. 9. 2015. Because of the steep and overgrown water edges, most of the work was done from boats. Both lakes were checked for amphibian activity and sampled with dipnets where possible. 20 funnel traps were set on the shore of both lakes.

The two lakes are located between Piran and Strunjan in Fiesa Bay, at the seafront of the Adriatic Sea. The lakes are man-made and used to be part of a clay pit. The larger lake closer to the sea contains brackish water, while the smaller one is a freshwater lake. Although the lakes were declared a natural monument, they are known to harbour different invasive species, mostly fish (Veenvliet 2007) and turtles (Standfuss et al. 2016).

Results and discussion

On 30. 5. 2014, a male bullfrog advertisement call was heard and recorded in the smaller of the two Fiesa lakes. Subsequently, on 9. 6. 2015, the calling song was heard again at the same locality. On the 28. 9. 2015, one male bullfrog was caught in a funnel trap at the smaller lake (Fig. 1). These are the first known records of the American bullfrog in Slovenia. We also recorded seven other aquatic vertebrate species. Five of them were alien: red-eared slider (*Trachemys scripta elegans*), eastern mosquitofish (*Gambusia holbrooki*), pumpkinseed (*Lepomis gibbosus*), largemouth bass (*Micropterus salmoides*) and goldfish (*Carassius auratus*).



Figure 1. a) Male specimen of American bullfrog caught in the funnel trap in Fiesa, western Slovenia (photo: Katja Pobjlšaj), and b) the location where the specimen was caught (red mark).

Slika 1. a) Samec volovske žabe, ujet v vršo v Fiesi, zahodna Slovenija (foto: Katja Pobjlšaj), in b) lokacija, kjer smo osebek ujeli (rdeči kvadrat).

The caught specimen was in a poor physical condition and had a trematode infection in the right eye. It was a fully adult male, with snout-to-vent length of 147 mm and a weight of 224 grams. It was taken to the Ljubljana ZOO, where it was tested for chytridiomycosis and ranavirus infection. The results were negative. Although there is no direct evidence, this specimen was likely introduced to the location intentionally or maybe unintentionally with the introduction of fish. There are no known garden ponds or other freshwater standing waters within the dispersal distance.

In the ensuing years, further efforts should be made by the state institutions to check whether this was a single introduced individual, or an actual population is present at the lake and other potentially appropriate locations in the area. In case more individuals are found, the species should be eradicated to prevent further spread and the potential diseases it transmits. Italian populations of bullfrog are often infected by the chytrid fungus *Batrachochytrium dendrobatidis*, playing the role of healthy carriers (Ficetola & Scali 2010). Eradication

measures should commence immediately as chances for the establishment of naturalized bullfrog populations here are high. According to the prediction model that is based on the maximum and minimum temperatures, precipitation and human footprint, coastal areas of the Northern Adriatic (including Slovenia) hold a high potential for successful establishment and invasion of this species (Ficetola et al. 2007b). Furthermore, Fiesa Lakes are even more susceptible to naturalization as this 'warm-adapted species' prefers permanent, large, densely vegetated deep waters, where tadpoles can overwinter (Spitzen-van der Sluijs & Zollinger 2010).

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